
ऑटोमोबाइल बॉडी की फिनिशिंग — रीति संहिता

भाग 2 यात्री कारों की रिफिनिशिंग

(पहला पुनरीक्षण)

Finishing of Automobile Bodies — Code of Practice

Part 2 Refinishing of Passenger Cars

(First Revision)

ICS 87.040

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FOREWORD

This Indian Standard (Part 2) (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Paints, Varnishes, and Related Products Sectional Committee had been approved by the Chemical Division Council.

The object of painting is to obtain desired product appearance consistent with maximum durability. The objective is achieved by proper application of organic fillers, putties, primers and enamels or nitrocellulose lacquers on to surfaces which have been cleaned and or chemically treated.

A large number of material specifications on ready mixed paints, enamels, varnishes, lacquers and allied products have created a need for codes of practice for finishing of automobile bodies, machinery, equipment, etc. There are two parts to this standard; the other part is:

Part 1 Finishing of passenger cars

This standard covers code of practice for refinishing of passenger cars. Code of practice for finishing of other automobile bodies and refinishing would be taken up in due course.

This standard was originally published in 1981. Now, this revision has taken to bring out the standard in the latest style and format of the Indian Standard. Also, the suitable modifications have been made in accordance with the current procedures followed throughout the industry. Additionally, references of Indian Standards have been updated wherever required.

The composition of the Committee responsible for the formulation of this standard is given in Annex A.

*Indian Standard***FINISHING OF AUTOMOBILE BODIES — CODE OF PRACTICE****PART 2 REFINISHING OF PASSENGER CARS***(First Revision)***1 SCOPE**

This standard prescribes practices to be followed in refinishing (painting) of already painted passenger cars. It covers surface preparation and finishing of cars using synthetic enamels and nitrocellulose lacquers.

2 REFERENCES

The standards given below contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of these standards:

<i>IS No.</i>	<i>Title</i>
IS 1303 : 1983	Glossary of terms relating to paints (<i>second revision</i>)
IS 5667 : 1970	Specification for thinner for cellulose nitrate based paints and lacquers
IS 5691 : 1970	Specification for lacquer, cellulose nitrate, pigmented, finishing, glossy
IS 6126 : 1971	Specification for nitrocellulose surfacer
IS 7982 : 1992	Automobile polish, liquid — Specification (<i>first revision</i>)
IS 8098 (Part 1) : 1976	Code of practice for finishing of automobile bodies: Part 1 Finishing of passenger cars

3 TERMINOLOGY

For the purpose of this standard, the definitions given in IS 1303 and IS 8098 (Part 1) shall apply.

4 SURFACE PREPARATION**4.1 Assessment of Surface Conditions**

Before taking up any refinishing work, the surface shall be carefully examined. A small area shall be thoroughly cleaned and critically examined for defects, such as cracking, preferably a small area shall be touched up with nitrocellulose finish to observe any lifting or crazing. Only if the paint film

is sound repainting shall be done over it; otherwise the paint film shall be completely removed and refinishing done on bare metal.

4.2 Removal of Chromium Beadings

If the area to be painted is crossed or edged, by chromium beadings or linings, they shall be removed first; otherwise, this may be a hindrance for refinishing work. Moreover, this may trap water, paint remover, etc, which may cause trouble at a later date. Welding, bronzing, etc, which may be required to be done while repainting cars involved in accidents, for instance, shall be done first. All tinkering work, like flattening of dents, etc, shall be completed prior to refinishing with paints.

4.3 Surface in Good Condition (Refinish of Local Areas)**4.3.1 Water Wash**

The area, if in good condition, shall be washed well with water to remove dirt and scum. Addition of a mild detergent to the water is recommended. The area shall be thoroughly rinsed with copious quantity of clean water.

4.3.2 Water Sanding

Area to be refinished shall be water-sanded using 400 grit paper. Rubber or felt sanding blocks or power sander may be advantageously used. With smooth even strokes, using plenty of clean water, the hardened paint film surface shall be removed and the imperfections shall be smoothened out. Wipe with suitable solvent to remove grease, wax, etc, and thoroughly dry, blowing out the crevices, etc, with clean compressed air. Hand-sanding is unavoidable for some contours of the cars. Dry-sanding is seldom resorted to, as it raises dust and clogs the paper. Use of solvent in place of water is tough on the hands. Gasoline shall not be used as it is dangerous and leaves oily residue. Apply colour coats as in 5.

4.3.2.1 Cut-throughs

The sanding operation given in 4.3.3 may cut-through the paint film to the metal, either because the paint film was thin or a localized rust spot or imperfection was removed. In this case, the edges surrounding the base metal shall be 'feather-edged', that is, finely sanded with 400 or still finer sand paper so that any edge or ridge is not felt by the finger tips.

4.3.3 Removal of Paint Dust from Sanding

The entire areas, including metal spots, shall be cleaned with water, dried and solvent wiped. All areas, including crevices are to be dried thoroughly using compressed air, free from oil or by force drying.

4.3.4 For Replacement Parts

If the area to be finished is a new bare metal replacement part, it shall also be thoroughly washed with cleaning solvent to remove oil, grease, etc.

4.3.5 Newly Soldered Areas

Newly soldered areas shall be washed with ammonia and thoroughly rinsed with water and cleaned with a suitable solvent/thinner afterwards.

4.3.6 Masking

Careful masking provides clean paint edges and avoids the ragged, sloppy appearance of the repainted areas. This very much contributes to a top class job. Use of various widths of good masking tape, papers and dispensing equipment will save much time and efforts. Use newspapers only over the windows or wheels. Use of newspapers over painted areas is usually poor practice because the ink from the paper may dissolve in paint solvents and cause stains. A narrow width tape shall be used on difficult curved areas because it is easier to manipulate. Wide tape may then be applied over the narrow tape. Water-soluble masking creams are also available which are brushed before spraying and washed off after the paint film is thoroughly dry.

4.3.7 Tack Ragging the Surface

After cleaning and drying the metal surface should be wiped with a clean tack rag prior to the application of the primer surfacer. Great care shall be taken to avoid touching the surface with hands, gloves, clothing, etc, which may contaminate the chemically cleaned surface with grease and dirt. Such contamination may seriously harm the final finish.

4.3.8 Application of Primer/Primer Surfacer

After the areas are dried thoroughly, primer/primer surfacer shall be applied to the bare metal surfaces and allowed to dry for the recommended period before the application of the subsequent coats.

4.3.9 Application of Putty

Spot putty can be applied to make up surface defects on the damaged area. Putty should be applied over the primer surfacer before it is sanded.

After drying the putty should be wet/dry sanded and dried thoroughly along with the primer surfacer using 80/220/320 grade grit paper depending on type of putty. All putty areas should be sealed with primer surfacer before the application of the finish.

4.3.10 Application of Finish

The finish may either be applied locally or over the whole surface depending upon the extent of rectification required.

4.3.10.1 Spot repairs

Local rectification shall be done by spraying the whole panel. However, spot spray may be carried out over existing nitrocellulose finish by using a special technique. Existing stoving synthetic or air-drying synthetic finish should always be rectified panel wise.

4.4 Surface in Bad Condition (Complete Refinish)

4.4.1 Removal of Old Finish

If the entire paint system is to be removed to the bare metal, because of the poor condition of the existing paint system, any one of the following procedures may be adopted.

4.4.1.1 By sanding

The damaged paint film may be removed by water sanding with 180 rough paper first and then with 400 or still finer paper to smooth out the scratches. Power sanding with 24 grinding discs followed by 50 grit disc is also recommended.

4.4.1.2 By strong alkali

The existing paint system may be removed by using strong alkali solutions. But great care shall be taken while handling the solution as it is injurious to the skin and attacks zinc and aluminium parts fitted in the cars.

4.4.1.3 Paint removers

Solvent type paint removers may also be used. These usually contain wax which forms the top layer and seals in the solvents under its surface. The solvents attack and lift the paint film. Correct application and thorough removal of the material after use is essential as any trace of wax left unremoved shall hinder the final finish.

4.4.1.4 By sand blasting

Sand blasting is excellent for larger areas. It may be used on any metal. It results in a perfect cleaning job.

4.4.2 Clean-up of Sanding Operations

After any of the operations (see 4.4.1.1 to 4.4.1.4) using 50 grit disc or steel-wool, any remaining rust spot or surface defects shall be removed.

4.4.3 Washing

Wash the entire area with suitable solvent to remove all the wax, grease or dirt, residues from paint removal operation. If a chemical type remover is used, a thorough water wash shall precede the solvent wash. Solvent wash is very important if solvent wax type paint removers have been used.

4.4.4 Anti-Rust Treatment

The bare metal shall be treated with a phosphoric acid based rust preventive material after diluting as directed by the manufacturer. Wipe off after 2 minutes to 3 minutes while still wet with a clean dry cloth. If the surface dries up, re-wet with more of the material and then wipe dry with a clean cloth again.

4.4.5 Drying

Blow out cracks and mouldings and wipe off any spatters.

4.4.6 Application of Primer/Primer Surfacer

Apply a coat of primer/primer surfacer within 30 minutes to prevent the formation of rust on the chemically cleaned surface. Take great care to avoid touching the surface with hands or clothing.

4.4.7 Putty Application

4.4.7.1 Putty may be applied over the primer surfacer before the surfacer is sanded. The surfacer and putty are then sanded in the same operation. It may also be applied over the primer. Apply putty in thickness not greater than that necessary to smooth out the rough spots. Putty is not a substitute for metal work which calls for the hammer, the grinder and the file. The excess putty shall be sanded off. It is better to make 2 or 3 thin applications of putty allowing adequate drying time between coats than to make one heavy application. The drying time for putty may vary with the type of putty and thickness applied.

4.4.7.2 After the putty has thoroughly dried, water sand the undercoats with 360 grit paper or finer. For putty area 80/220/320 grit paper may be used based on type of putty. A final wet sanding with 400 grit paper or finer is recommended. Any cut-through to the metal shall be re-sprayed with surfacer and scuff-sanded after drying.

4.4.7.3 All putty areas shall be sealed by the application of primer surfacer. This shall be dried and scuffed before the application of the finish coat.

4.4.7.4 Wipe surface with tack-rag before applying colour coats.

4.5 Finish

The finish shall be sprayed all over. Normally 2 to 3 coats are required to get the desired film built.

4.5.1 Details on the different finish systems are given in Table 1.

4.6 General

4.6.1 Safety Rules for the Paint Shop

Provide good ventilation system to remove fumes. Do not permit smoking in and around the spray areas. Place fire extinguishers and equipment in handy spots. Never drive a car in or out of the spray booth; push it by hand. Never use temporary electrical connections. Be sure ground wires are intact to avoid static electricity. Regularly check all electrically driven equipment. Keep the areas including the floors clean. Dispose of dirty range daily without fail before quitting time.

4.6.2 Hints for Good Workmanship

4.6.2.1 Thoroughly stir or shake the can of paint. A power-driven shaker is very helpful. The stirring or agitation results in a uniform mixture of pigment, binder and thinners.

4.6.2.2 It is very important to stir undercoats well because of their heavier pigment content.

4.6.2.3 Reduce with the right type and correct amount of thinner as recommended by the manufacturer. Economizing on cheap thinner may spoil the finish. Always keep the paint and thinner at the room temperature.

4.6.2.4 Always add thinner slowly to the paint and stir constantly. Adding thinner quickly may result in seedy looking paint jobs.

4.6.2.5 Strain the reduced topcoats through a fine mesh metal or suitable strainer. A 100 mesh screen (100 parallel wires per 2 cm to 5 cm) is good. Use a coarse screen (50 mesh) for all undercoats.

4.6.2.6 Do not inter-mix the same type of products, like the primer, primer surfacer, colour coats, etc, of different brands. They may not be compatible.

4.6.2.7 Never apply a synthetic primer over a lacquer, when the topcoat also is going to be a lacquer. This sand-witching of the primer will result in 'lifting'. They may only be lightly dry scuffed.

Table 1 Process of Refinishing of Passenger Cars

(Clause 4.5.1)

Sl No.	Process Detail	Material	Specification Requirement
(1)	(2)	(3)	(4)
i)	In case of welding:		
	a) If the surface is to be welded the area shall be thoroughly cleaned with mineral turpentine and a suitable welding sealer or primer applied.	Any suitable welding sealer or welding primer may be used.	Specification to be drafted. At present proprietary materials are being used. The primer shall prevent corrosion starting from the welded joints after welding and also the parts shall be capable of being welded after the application of the primer.
	b) <i>Derusting</i> — apply a suitable derusting composition with steel wool and remove the rust, if any, from both inside and outside and wipe with cotton rags and blow compressed air all over the area inside and outside.	Any suitable derusting composition based on phosphoric acid may be used.	Specification to be drafted. At present proprietary materials are being used. After application wipe off, the area shall be completely free from rust and shall not show any stickiness.
ii)	On brazed joints:		
	Apply epoxy stopper putty on brazed joints.	Two - component epoxy stopper putty may be used.	Specification to be drafted. This material shall make the brazed joints completely waterproof and shall give complete protection against corrosion.
iii)	Primer/Primer surfacer		
	a) One coat of synthetic air-drying primer is sprayed at a viscosity of 20 seconds to 22 seconds in IS Cup No. 4 at 30 °C to get a dry film thickness of 25 microns. Air-dry for 16 h and apply 2 coats of nitrocellulose surfacer by spraying with 15 minutes interval between coats. The surfacer is thinned to 18 seconds to 20 seconds in IS Cup No. 4 at 30 °C with the recommended thinner. It is allowed to dry for 1 h for putty application.	Proprietary materials are being used.	Specification to be drafted. It dries to touch in 30 minutes. It takes nitrocellulose putty in 30 minutes and nitrocellulose primer surface in one hour.
	b) Two coats of synthetic air-drying primer surfacer is sprayed at a viscosity of 22 seconds to 24 seconds in IS Cup No. 4 at 30 °C to get a dry	Proprietary materials are being used.	Specification to be drafted.

Table 1 (Continued)

Sl No.	Process Detail	Material	Specification Requirement
(1)	(2)	(3)	(4)
	film build of 50 microns. This is airdried for 4 h to 6 h before putty application.		
	c) For spot touch-up		
	One coat of nitrocellulose touch-up primer may be sprayed at a viscosity of 18 seconds to 20 seconds in IS up No. 4 at 30 °C to get a film thickness of 20 microns. Then 3 coats of nitrocellulose primer surfacer are sprayed as indicated above and allowed to airdry for 4 h.	Nitrocellulose primer surfacer.	Conforming to IS 6126.
iv)	Putty		
	Nitrocellulose putty is lightly applied over nitrocellulose primer surfacer synthetic primer surfacer wherever necessary and allowed to airdry for 4 h.	Proprietary materials are being used.	Specification to be drafted.
v)	Surfacer after putty flattening		
	The primer surfacer/putty is wet-sanded by hand or machine and then washed with water inside and outside and air is blown to remove water and dried at elevated temperature or with cloth. Exposed putty areas and portions where bare metal is exposed during sanding are touched up with nitrocellulose or synthetic primer surfacer airdried and dry-scuffed with emery paper No. 400. The area is tack-ragged to remove loose particles of dust and dirt.	Proprietary materials are being used.	Specification to be drafted. This shall be a non-sanding, fast drying type of primer, which when dried forms a non-absorbent smooth surface with good adhesion on bare metal and capable of protecting it from corrosion. This shall hold good for lacquer and stoving enamels.
vi)	Application of finish		
	Nitrocellulose based touch-up finishes are used for touch-up on the areas using the appropriate thinner recommended by the supplier; 2 coats are to be sprayed with 5 minutes interval between the coats. After 5 minutes, a mist coat of the recommended thinner shall be sprayed on the dry spray area to ensure proper merging of the coats. A flash off time of 10 minutes to 15 minutes is allowed and then the touched portions are airdried overnight or force dried for	Proprietary materials are being used at present.	This product shall be such that it gives a finish comparable to stoving enamels.
		Lacquer	Conforming to IS 5691.
		Thinner	Conforming to IS 5667.

Table 1 (Concluded)

Sl No.	Process Detail	Material	Specification Requirement
(1)	(2)	(3)	(4)
	15 minutes to 20 minutes with infrared lamps. Touch up of synthetic stoving enamels shall be done edge-to- edge, that is, if the damage is on the door panel, the whole door panel shall be finished with the finish and dried as before. In case of complete refinish either nitrocellulose finish or synthetic airdrying finish can be used. Three coats of nitrocellulose finish followed by a mist coat are recommended. Synthetic air-drying finish should be thinned to 20 seconds to 22 seconds in IS cup No. 4 with recommended thinner and two coats should be sprayed with 10 minutes flash between coats.		
viii)	<i>Polishing</i> The refinished touch-up areas are polished with suitable liquid polish with mechanical buffing with soft mop. This polishing operation is to be carried out to remove the dry spray and proper merging of the touched-up areas. Polishing is preceded by rubbing with abrasive rubbing compound. For complete refinishing it is desirable to carry out the burnishing and polishing operation after a few days.	Automobile polish, liquid.	Conforming to IS 7982.

4.6.3 Colour Accuracy

4.6.3.1 Colour change in the paint film may be caused by the weather. Continuous exposure to the ultra violet rays of strong sunlight have greatest effect on the colour.

4.6.3.2 Matching an old finish that has drastically changed in colour, is usually difficult. It is easier to refinish the car completely. To test a finish for colour accuracy, spray the new colour over the same base colour that will finally be used. Allow it to dry, then compare it against a polished section. Spraying over the same base colour is particularly important for aluminium pigmented colours and for many new semi-opaque colours. The base coat has a marked effect on the final appearance.

4.6.3.3 Before actually using the paint, make sure to stir the fresh can of paint thoroughly and reduce with the correct amount and type of thinner or reducer. Make sure to pay close attention to the spraying technique. Neglect of any of these factors may result in an off colour.

4.6.3.4 Spraying in different ways, wet, dry, heavy and thin shall result in distinct colour variation. Most colours shall show some variation because of differences in spraying or reduction. This is specially so in case of low hiding and indescendent colours.

4.6.4 Rubbing and Polishing

4.6.4.1 If rubbing is done too soon before all traces of solvents have evaporated from the film, hazing or dulling may result. The rubbing/polishing shall be done after 48 hours of application of nitrocellulose lacquer. Rubbing may be done either by hand or by wheel-buffer. If a hand rubbing compound is to be used, apply the compound sparingly to a rubbing ball made of a clean, cheese cloth. Rub with straight back and forth motions in one direction until the desired smoothness is obtained. After obtaining the desired surface, polish to a high lustre with another clean cloth-preferably cotton flannel. In case of the material being painted with synthetic enamel, polishing shall be done after 7 days of drying.

4.6.4.2 Wheel-polishing compounds should be applied with a brush to the colour film. As the wheel is applied, the compound shall spread evenly and rapidly produce a bright, glossy finish.

5 ADDITIONAL REQUIREMENTS

Brush all the upholstery. If a leatherette upholstery has been used, brighten it up with recommended leatherette cleaner. Wash the rubber or composition floor mats with water and detergents with a soft cloth, dust and dash, steering wheel and mouldings. For old tyres, whether white side or black walls

rubber dressing will make them look new. Sometimes a good washing with water is sufficient. For chrome strips and bumper, a commercial type chrome cleaner or steel wool and soap will do, provided the chrome has not completely rusted away.

6 ECONOMY IN REFINISHING JOB

Avoiding high air pressure and overspray and maintaining a low paint inventory at all times, will result in considerable economy in refinishing jobs.

ANNEX A

(Foreword)

COMMITTEE COMPOSITION

Paints, Varnishes and Related Products Sectional Committee, CHD 20

<i>Organization</i>	<i>Representative(s)</i>
Institute of Chemical Technology, Mumbai	PROF P. A. MAHANWAR, (Chairperson)
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Indian Small Scale Paint Association, Mumbai	SHRI MUKESH GOYAL SHRI H. SATHYANARAYAN (<i>Alternate I</i>) SHRI NIRAV RAVESHIA (<i>Alternate II</i>)
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Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the website- www.bis.gov.in or www.standardsbis.in.

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Amendments Issued Since Publication

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